

families of hedgehogs, swine, and dormice, and of the genera *Meles*, *Equus*, *Bos*, *Gazella*, *Mus*, *Cricetus*, *Meriones*, *Dipus*, and *Hystrix*, among mammals; and of the important families of flycatchers and starlings, the extreme rarity of larks, the scarcity of warblers, and the absence of such widespread genera as *Acrocephalus*, *Hypolaïs*, *Ruticilla*, *Saxicola*, *Accentor*, *Garrulus*, *Fringilla*, *Emberiza*, *Motacilla*, *Yunx*, *Cuculus*, *Caprimulgus*, *Perdix*, *Coturnix*, and all the true pheasants, among birds, many of which are groups which may almost be said to characterise the Old World as compared with the New, must surely be allowed to have great weight in determining this question.

The geographical individuality of the two regions is of no less importance, and if we once quit these well-marked and most natural primary divisions we shall, I believe, open up questions as regards the remaining regions which it will not be easy to set at rest. There runs through Prof. Heilprin's paper a tacit assumption that there should be an equivalence, if not an absolute equality, in the zoological characteristics and peculiarities of all the regions. But even after these two are united, there will remain discrepancies of almost equal amount among the rest, since in some groups the Neotropical, in others the Australian, far exceed all other regions in their speciality. The temperate and cold parts of the globe are necessarily less marked by highly peculiar groups than the tropical areas, because they have been recently subjected to great extremes of climate, and have thus not been able to preserve so many ancient and specialised forms as the more uniformly warm areas. But, taking this fact into account, it seems to me that the individuality of the Nearctic and Palearctic regions is very well marked, and much greater than could have been anticipated; and I do not think that naturalists in general will be induced to give them up by any such arguments as are here brought forward.

ALFRED R. WALLACE

A Remarkable Phenomenon.—Natural Snowballs

I TAKE the liberty of inclosing a copy of an account of natural snowballs which I furnished to the *Courant* newspaper in this place. It may be well to state that the distance from Long Island Sound to Massachusetts is some seventy miles, and that the Connecticut Valley Railroad is about fifty miles long, and runs close to the bank of the Connecticut River for some forty miles; the rolls of snow on the frozen river are said to have been very large and handsome.

SAMUEL HART

Trinity College, Hartford, Conn., U.S.A., February 22

On Tuesday evening a light but damp snow fell upon the crust that had formed over the snow of Sunday's storm; and the south wind, which arose at a later hour, produced an unusual phenomenon. Wednesday morning the college campus, the park, and vacant lots everywhere hereabouts were seen to be strewn with natural snowballs, some of them resembling spheres with diameters of from one to nine inches or more, and others looking very much like rolls of light cotton batting, having a cylindrical shape, but in nearly every case with a conical depression at each end reaching nearly or quite to the middle. It was easy to see how the balls had been formed, as it is easy to see how boys roll up the snow for their forts. The wind had in each case started a small pellet of the moist snow, and it had rolled along until it grew so large that the wind could move it no further. The ball not only increased in diameter as it rolled, but also grew gradually in length as a little more of the snow stuck to it on each side, and thus the snow was formed into the peculiar shape described—that of a cylinder with a hollow at each end, as if a long isosceles triangle were rolled up, beginning at its vertex. The largest of the cylinders measured on the college campus had a diameter of twelve inches and a length of eighteen inches, while others in the fields in the neighbourhood seemed much larger. The path of the balls could in many cases be readily traced for a distance of twenty-five or thirty feet. The snow, it should be added, was not at all closely packed, but lay together very lightly and yielded to a slight touch, so that it was impossible to move a ball without breaking it.

Observers in other parts of the city report that some balls were seen of the size of a barrel which left tracks behind them for more than sixty feet. From East Hartford it is reported that they studded the fields thickly, especially in places where the wind had a long range, and were of every size to that of a half bushel or larger. Similar balls were seen yesterday morning in many places from the Sound north to Massa-

chusetts. All along the line of the Valley Railroad they appeared on every rod of ground, and at some places they had left tracks showing that the wind had blown them in every direction, even in some cases up hill.

This interesting phenomenon, though quite unusual, has been noticed before in different places in this country and elsewhere, the most striking instance on record being one which was observed in New Jersey in 1808; this was in the daytime, when the whole process could be watched. On this occasion some of the masses of snow which were rolled up by the wind attained a diameter of three feet. They appear to have been seen, however, over an area of only some four hundred acres, whereas the snowballs yesterday were spread thickly over many square miles.

[We have received a communication on the same subject from Prof. Brocklesby of Hartford.—ED.]

The Late Transit of Venus

I AM told that, in referring to the observations on the late transit of Venus which were made from a station on our college grounds by the astronomers of the German Imperial Commission, you speak of them as using the photographic process. This is not correct; besides contact observations they restricted themselves to the use of the heliometer. The first and the second contacts were not seen by reason of clouds; but four half sets and six full sets of heliometric measurements were made—128 in all. The third and the fourth contacts were observed by the German astronomers and by myself.

SAMUEL HART

Trinity College, Hartford, Conn., U.S.A., February 22

Rankine's "Rules and Tables"

I DO not know upon what authority your reviewer of Rankine's "Rules and Tables" bases his dictum that the r in the rule for the extension or compression of a spiral spring should be to the second power instead of to the third power. Prof. Rankine's view was that it should be r^3 . I would refer your reviewer to vol. xviii. of the *Transactions of the Institution of Engineers and Shipbuilders in Scotland*, where he will find, amongst other results of an experimental committee's investigations upon the important question of the loading of safety-valves by such springs, that the *third* power of the radius or diameter of the spring is also used.

W. J. MILLAR

Glasgow, March 10

[The formula given by Mr. Millar is, the writer of the notice informs us, perfectly correct, and the error is his.—ED.]

Meteors

ABOUT five minutes past seven this evening I saw the most beautiful "shooting star" I have ever witnessed. It was moving from east to west directly over this town, and disappeared at an apparent distance of ten or twelve miles, after traversing an arc of about 75° as I saw it. It was visible whilst one might count ten or twelve at the usual rate of speaking. In its course it not only left a most unusually long train of light behind, but whole pieces kept dropping. What appeared is thus best described. These pieces followed the original for a space, leaving perceptible lines of light. Probably ten or a dozen such pieces were broken off during the time I was looking. Some idea of it may be gathered from the fact that for a time I thought it was a rocket. The light was remarkably white, the brilliance much above that of Venus at any time, and its rate of motion slow. The most remarkable feature, however, was the continuous breaking away of pieces, which left in turn visible trains of light.

THOMAS MASHEDER

The Grammar School, Ashby-de-la-Zouch, March 17

IN NATURE, vol. xxvii. p. 434, reading somewhat hastily, I took the brilliant meteor there mentioned to be one I myself saw. Reading more carefully, however, in last week's issue, I see that both day and hour and direction differ. On March 4, about 8.45 p.m., a very large and bright meteor passed at a low altitude from south to north. It was of a greater apparent size than Venus, quite as bright, but with a greener light. The motion was slow, no train; it only became incandescent during

a short part of its transit, and passing behind the roofs of some houses was immediately lost to sight. HENRY CECIL
Bregner, Bournemouth, March 20

P.S.—If a line be drawn north and south, the meteor became visible at a point due east, which direction I was facing.

THE BRITISH CIRCUMPOLAR EXPEDITION¹

THE journey to Fort Rae, though long, was full of interest and variety. Our party, consisting of myself, two sergeants, and an artificer, of the Royal Artillery, left Winnipeg on June 9 by steamer for Fort Carlton, on the Saskatchewan, *via* Lake Winnipeg. We were detained a day in that lake by ice, but reached the mouth of the Saskatchewan on the 13th, where we were delayed four days transshipping cargo to the river steamer, which lay three miles off at the upper end of the rapids; a tedious voyage of eight days took us to Carlton, a stockaded port on the south bank of the river. For the first three days the country seemed one immense swamp, with numerous shallow lakes; then the banks gradually grow higher, till at "the Forks" (the confluence of the north and south branches of the Saskatchewan) they are about 150 feet above the river. Here the soil seems very rich and fertile, and about the new settlement of Prince Albert, a day higher up, the country is quite English in appearance—undulating, covered with rich grass, with woods here and there—a far more attractive-looking country than the flat, treeless prairie near Winnipeg.

From Carlton, after a day or two spent in hiring transport carts, we started on the 30th with a train of ten carts, containing our provisions and baggage. The country was very pretty, well wooded and watered, with duck, snipe, and prairie chicken in abundance; it was at times difficult to believe one was not in an English park. But the most vivid imagination cannot picture the swarms of mosquitoes that at times attacked us: they came against our faces like flakes in a heavy snowstorm, and though we found our veils and gloves a good protection whilst travelling, yet, when mealtimes came, veils had to be laid aside, and the wretched insects seized the opportunity of taking their meal too.

On the third day of our journey, on reaching the crest of some rising ground, an extended view opened before us, ridge behind ridge, a sombre sea of pinewood stretching away in the distance. It was the great sub-Arctic forest which extends northwards to the barren grounds at the Arctic circle and east and west to the Atlantic and the Pacific. On entering the woods the mosquitoes were not quite so bad, but our unfortunate animals became the prey of an enormous horde, which settled on them in thousands, biting them till they were streaming with blood. Fortunately they only came out during the heat of the day, and we were sometimes obliged to make a halt and light fires so that the animals might stand in the smoke, which they were very willing to do; indeed they often put a newly-lighted fire out by rolling in it.

The road through the woods was very bad, and breakdowns were numerous, but at last on July 9 we reached Green Lake, which we left by boat on the 11th for Ile à la Crosse. Our conveyance was now one of the Hudson Bay Company's inland boats, with a crew of eight Indians. As we had the stream with us, we were able to drift all night, only landing when we required to cook; so we reached Ile à la Crosse early on the 14th.

We left it the same evening with a crew of eight Chipewyans, the best crew we ever had. I think they must have pulled sixty miles on one day, the day after we left the fort. On the evening of that day we had an aurora shortly after sunset, which is unusually early in

the evening for one. This one appeared to be remarkably close, from its rapid motion and from its being between us and a cirro-cumulus cloud. It was accompanied by a distinct swishing noise like the sound of a sharp squall in a ship's rigging, or the noise a whip makes in passing through the air. I have not heard it since, though there have been plenty of auroras, but from what I have been told by those who have passed their lives in the country, I am of opinion that this sound is occasionally, though rarely, heard, and that it would be heard oftener were it not that the aurora is generally at too great a height.

Two more days brought us to Portage la Loche, a track of some fourteen miles across the watershed dividing the basin of the Arctic Ocean from that of Hudson's Bay. It is fairly level till the last mile, when the edge of the valley of the Clearwater River is reached, some 600 feet above the stream. From this point the view of the valley is very fine, and it strikes one the more from the monotonous nature of the scenery hitherto. The river flows between two ranges of hills, from 800 to 1000 feet in height, and here and there in rapids between limestone cliffs. The first "portage" (where the boats have to be hauled some distance overland) is particularly picturesque, but the whole valley abounds in bits that would delight an artist's eye.

On July 28 we reached the Athabasca River, a fine stream, half a mile or more in width, and the strong current, aided by a fair wind, took us to the lake in a couple of days. There are several springs of naphtha and one of sulphur on the banks.

On crossing Lake Athabasca to Fort Chipewyan, there is a complete change in the character of the country. On the south side the banks are nearly level with the water, all reeds and mud; on the north side is a savage wilderness of Laurentian rock. From a hill at the back of the fort is an extensive view of this strange and desolate country. To the west the lake stretches away to the horizon; on the other side is a mixture of lake, island, and river, and to the north the land, a wilderness of rock in low rounded hills, with a few stunted pines in the valleys, all pretty enough, but so lonely looking.

We were detained a fortnight at Fort Chipewyan till the arrival of the Mackenzie River boats. The heat was at times extreme—as much as 90° in the house.

The Slave River, or Mackenzie, as it really is, is a magnificent river, especially after its junction with the Peace River, which is at least as big as the Athabasca. The united stream is often a mile in width. About half way to Slave Lake are the rapids, where the scenery is very fine. There are four portages, over three of which the boats had to be hauled, so it was two days' work getting through them. We had a sharp frost on the morning of the 19th, the buckets, &c., that were left with water in them had a quarter of an inch of ice on them in the morning.

On the next evening, while running down the rapid to the last portage, the "Portage des Noyés," after sunset, a bright parhelion made its appearance, some 10° or 12° above the horizon. It was of a bright red colour, and threw a brilliant reflection in the water, remaining visible for about twenty minutes, when it changed into a crimson column, that gradually died away.

On August 22 we reached Fort Resolution—a wretched-looking place on a flat muddy coast—and the same evening we left for Fort Rae. At sunset the pilot of the boat insisted on stopping for the night at a small rocky island at the mouth of the Slave River. I thought it a pity to stop as we had a fair wind, but the natives of the country have a great dread of lakes, and certainly Great Slave Lake is a stormy place. At midnight a heavy swell suddenly arose, and our boat was stove in and sunk in a very few minutes. It was a pretty wet job to land all the baggage and stores, which of course were all saturated

¹ Letter from Capt. Dawson, R.A., in command of the Expedition. See p. 243.